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Difunctional Polyisobutylene Prepared by Polymerization of Monomer on Molecular Sieve

A process has been devised for producing difunctional polyisobutylene by polymerization of the isobutylene monomer on a molecular sieve catalyst. The new polymer is difunctional in that it has a double bond (unsaturated group) at each end of the hydrocarbon chain. The process is relatively simple and can be easily controlled to yield difunctional isobutylene polymers (or prepolymers) ranging in molecular weight from 1150 to 3600. These polymers show a potential for copolymerization and cross-linking with other monomers to form new and useful elastomeric materials.

Experimental quantities of the difunctional polyisobutylenes were prepared in a 300 ml flask equipped with a magnetic stirrer and a side filling tube which could be sealed to a vacuum manifold. In beginning a run, a weighed amount of molecular sieve granules having 5 Å pores is placed in the flask and the system is degassed under vacuum (10^{-4} to 10^{-6} torr), with intermittent heating to 100°C. The flask is then placed in a liquid nitrogen bath and a measured volume of reagent grade isobutylene is condensed onto the molecular sieve. The contents of the flask are degassed at 10^{-6} torr, quickly warmed to reaction temperature (at which isobutylene is liquid), and finally stirred at autogenous pressure for a given period. After distillation of excess isobutylene and other low-boiling frac-

tions from the flask, the molecular sieve is washed with pentane to dissolve the adsorbed polyisobutylene. The resultant solution is washed with water in a separatory funnel and dried over anhydrous magnesium sulfate. The solution is then decanted from the drying agent and evaporated at reduced pressure until the polymer appears. It is recovered as a clear, colorless, viscous liquid after final vacuum drying at 50°C. The molecular weight and percentage yield of the polyisobutylene were found to increase as the reaction period (contact time on the molecular sieve) increased or the temperature increased over the range from -141° to +35°C.

Note:

Requests for further information may be directed to:
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No patent action is contemplated by NASA.

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